CONSTRUCTION
BASIC
VETERANS

UTILITIESMAN

Qualification Standards

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DEPARTMENT OF THE NAVY
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UTILITIESMAN

Qualification Standards

UT Topics - Phase 1 (UT-1)		UT Topics - Phase 2 (UT-2)	
Topic #	Topic Title	Topic #	Topic Title
700	Mathematics	701	HVAC/R Fundamentals
704	Silver Soldering Copper Pipe/Tube	702	Electricity and Cathodic Protection
707	Introduction to Utilities System	703	Pump Maintenance
708	Interior/Exterior Waste Systems	705	Heating Systems
709	Interior/Exterior Water Systems	706	Air Conditioning/Refrigeration Systems
710	Fixture Installation		

The above items may be accomplished by (but are not limited to) utilizing one or more of the training resources listed below. Selecting the right training resource(s) is the responsibility of your chain of command. Considerations such as cost and availability must be included in determining which resource(s) best meet your and your command's particular needs.

Training Resources

Mobile Training Teams	Vocational Technical Schools	Utility companies
NCTC Port Hueneme	Local Contractors	OJT "AT" with an active duty NMCB
NCTC Gulfport	Contract instructors	Municipal Public Schools (night school)
Other Naval/Service Schools	Municipal public works	Other(s)

TABLE OF CONTENTS

UTILITIESMAN

Qualification Standards
Section 700

700 Mathematics

References:

~~a. Mathematics, Vol. 1. NAVPERS 10069-C~~ [1]
~~b. General Mathematics for Construction Ratings, NAVPERS 94415~~[2]
a. Mathematics, Basic Math and Algebra, NAVEDTRA, Course No: 14139
b. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
c. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

700.1 With the use of a calculator, **CONVERT** whole numbers, fractions, decimals, and percents.

_____
(Signature) (Date)

[1] Obsolete. Replaced with NAVEDTRA 14139. See NAVEDTRA Number Conversion Table, Updated 27 September 2002.

Note: NAVEDTRA 10069-C was more recently published as *Mathematics, volume 1*, NAVEDTRA 10069-D1 (also obsolete). Volume 1 provides a review of basic arithmetic and elementary algebra; it includes fractions, decimals, percentages, exponents, radicals, and logarithms. It also contains exercises in factoring polynomials, linear equations, ratio, proportions, variation, complex numbers and quadratic equations. It presents brief introduction to plane figures, geometric construction, and trigonometry. Reduction, and General Maintenance books.) Reference: *Electronics Technician Supervisor (ET1)* NAVEDTRA: 14085, page 1-6.
Retrieved January 3, 2003 from https://www.advancement.cnet.navy.mil/products/web-pdf/tramans/bookchunks/14085_ch1.pdf

[2] Obsolete.

Section 700, cont'd

.2 With the use of a calculator, **DEMONSTRATE** proficiency to 70% accuracy in using formulas for measurement of pipe and single line offsets.

_____

(Signature) (Date)

.3 With the use of a calculator, **DEMONSTRATE** proficiency to 70% accuracy in calculating pitch and grade.

_____

(Signature) (Date)

Additional question for your review (no signature required):

- With the use of a calculator, **SOLVE** mathematical problems common to the Utilitiesman rating.

UTILITIESMAN

Qualification Standards

Section 701

701 Heating, Ventilation, A/C, and Refrigeration Fundamentals

References:

a. SW J3ABR3E131 003/004 I, HVAC/R Physics[3]
b. PC J3ABR3E131 003/004 I, HVAC/R Physics[4]
c. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
d. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

701.1 **EXPLAIN** the structure-of-matter, energy, and un-stored energy, as it relates to HVAC and refrigerant.

_____

(Signature) (Date)

.2 **EXPLAIN** the theory of the following:

1. Laws of thermodynamics
2. Heat flow
3. Fluid flow
4. Gas Laws

_____

(Signature) (Date)

[3] USAF Student Instructional Materials
[4] USAF Student Instructional Materials

UTILITIESMAN
Qualification Standards
Section 702

702 Electricity and Cathodic Protection

References:
a. SW J3ABR3E131 003/004 II, Electricity[5]
b. PC J3ABR3E131 003/004 II, Electricity[6]
c. Cathodic Protection Systems Maintenance, NAVFAC MO-307
d. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
e. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

702.1 **DEFINE** voltage, current and resistance.

_____
(Signature) (Date)

.2 **EXPLAIN** Ohm's Law.

_____
(Signature) (Date)

.3 **DIAGRAM** a series circuit, a parallel circuit, and a series-parallel circuit; **EXPLAIN** the relationship between current, voltage, and resistance in each.

_____
(Signature) (Date)

[5] USAF Student Instructional Materials
[6] USAF Student Instructional Materials

.4 **DESCRIBE** the types and uses of electrical test equipment

_____
(Signature) (Date)

.5 Given a set of electrical values, **INTERPRET** their meaning.

_____
(Signature) (Date)

.6 **DEFINE** residual magnetism and magnetic induction.

_____
(Signature) (Date)

.7 **EXPLAIN** transformer principles and types available.

_____
(Signature) (Date)

.8 **IDENTIFY** the operating principles of the following electromagnetic devices and their uses.

1. Solenoid valves
2. Relays
3. Contactors
4. Magnetic line starters

_____
(Signature) (Date)

.9 **LIST** the types of electrical safety devices and where they're used.

_____
(Signature) (Date)

.10 Given an electrical drawing, **INTERPRET** the symbols and **EXPLAIN** the sequence of operation.

_____
(Signature) (Date)

.11 **EXPLAIN** how single-phase and three-phase induction motors operate.

_____
(Signature) (Date)

.12 **STATE** the hazards associated with energized circuits whether testing motors or motor control circuits.

_____
(Signature) (Date)

.13 **CONNECT** a single-phase and a three-phase motor using proper work and safety procedures.

_____
(Signature) (Date)

.14 **PERFORM** tests on motor control circuits using a Multimeter.

_____
(Signature) (Date)

.15 **EXPLAIN** the basic principles of corrosion.

_____
(Signature) (Date)

.16 **LIST** the various coatings and wrappings used for cathodic protection.

_____
(Signature) (Date)

.17 **EXPLAIN** in detail the applications where the above wrappings and coatings are used. How are they applied?

_____
(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 703

703 Pump Maintenance

References:
a. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
b. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

703.1 **IDENTIFY** the five major types of pumps and their most common uses.

_____
(Signature) (Date)

.2 **LIST** the types and major components of velocity pumps.

_____
(Signature) (Date)

.3 **IDENTIFY** the uses of rotary displacement pumps and its major components

_____
(Signature) (Date)

.4 **EXPLAIN** the types of reciprocating displacement pumps and how they function.

_____
(Signature) (Date)

Section 703, cont'd

.5 **IDENTIFY** the areas where airlift pumps could be used and advantages/disadvantages of this type of pump.

_____
(Signature) (Date)

.6 **EXPLAIN** the operation and use of a turbine pump and ejector pump.

_____
(Signature) (Date)

.7 **EXPLAIN** the safety concerns that must be considered (when doing pump maintenance work).

_____
(Signature) (Date)

.8 **EXPLAIN** the most common pump failures.

_____
(Signature) (Date)

.9 **PERFORM** maintenance on a centrifugal pump.

_____
(Signature) (Date)

.10 **PERFORM** maintenance on a diaphragm pump.

_____
(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 704

704 Silver Soldering Copper Pipe/Tube

References:
a. Modern Refrigeration and Air Conditioning
Althouse, Turnquist, Bracciano, 1992 Edition
b. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265,
1998 Edition
c. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279,
1999 Edition

704.1 **IDENTIFY** the types, characteristics, and uses of refrigeration tubing.

_____
(Signature) (Date)

.2 **EXPLAIN** the selection/variety of fittings that are used in refrigeration systems.

_____
(Signature) (Date)

.3 **EXPLAIN** how tubing is cut and bent, with what tool(s), and why these specialty tool(s) are used.

_____
(Signature) (Date)

.4 **COMPARE** MAPP gas and acetylene benefits - one over the other.

_____
(Signature) (Date)

Section 704, cont'd

.5 **EXPLAIN** the safety precautions associated with MAPP gas brazing.

_____
(Signature) (Date)

.6 **EXPLAIN** the safety precautions associated with Oxyacetylene brazing and why it is much more serious than MAPP.

_____
(Signature) (Date)

.7 **IDENTIFY** the precautions that must be considered when handling acetylene gauges, hoses, cylinders, and other associated components.

_____
(Signature) (Date)

.8 **DESCRIBE** the parts of an oxyacetylene welding torch.

_____
(Signature) (Date)

.9 **WHAT** is a standard precaution when opening the cylinder valve of any compressed gas and **WHY.**

_____
(Signature) (Date)

.10 **DESCRIBE** the process of welding equipment set up.

_____
(Signature) (Date)

.11 **DESCRIBE** the steps of shutting down welding apparatus.

_____
(Signature) (Date)

.12 **EXPLAIN** the annealing process and when might this be used.

_____
(Signature) (Date)

.13 **EXPLAIN** the terms, flaring and swaging; how do they relate to the refrigeration field.

_____
(Signature) (Date)

.14 **IDENTIFY** the steps in silver brazing a joint.

_____
(Signature) (Date)

.15 **PERFORM** the following skills;

1. Make flare joint
2. Make a joint using the swedging method
3. Silver braze a joint together
4. Soft solder a joint together

_____
(Signature) (Date)

.16 **EXPLAIN** the reason for different tip sizes and methods of applying heat to a joint.

_____
(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 705

705 Heating Systems

References:
a. SW J3ABR3E131 003/004 III, Heating Systems[7]
b. PC J3ABR3E131 003/004 III, Heating Systems[8]
c. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
d. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

705.1 **EXPLAIN** the elements of combustion and combustion control.

_____
(Signature) (Date)

.2 **EXPLAIN** the nature of oil and gas fuels as they relate to heating systems.

_____
(Signature) (Date)

.3 **DESCRIBE** oil/gas handling, components, and storage.

_____
(Signature) (Date)

[7] USAF Student Instructional Materials
[8] USAF Student Instructional Materials

Section 705, cont'd

.4 **STATE** the safety precautions associated with inspecting a gas distribution system; what type of solution is used for leak detection.

_____
(Signature) (Date)

.5 **DESCRIBE** the construction and operation of the atmospheric gas burner, the power burner and the pulse burner.

_____
(Signature) (Date)

.6 **EXPLAIN** the operation of controls associated with gas burners (regulators, pilot-stats, gas valves, and ignition systems).

_____
(Signature) (Date)

.7 **EXPLAIN** unburned fuel and burned fuel.

_____
(Signature) (Date)

.8 **WHAT** are the operating principles of space heaters.

_____
(Signature) (Date)

.9 **EXPLAIN** the operation and types of warm air furnaces.

_____
(Signature) (Date)

Section 705, cont'd

.10 **DEMONSTRATE** the pre-operational inspection and operational test for oil burners, space heaters, and warm air furnaces.

_____
(Signature) (Date)

.11 **DESCRIBE** the necessary procedures and reasons for performing recurring maintenance on oil and gas fired burners.

_____
(Signature) (Date)

.12 **NAME** the operating principles of combustion analyzers.

_____
(Signature) (Date)

.13 **IDENTIFY** the troubleshooting procedures concerning an oil burner and then a gas burner.

_____
(Signature) (Date)

.14 **TROUBLESHOOT** a gas warm air furnace and an oil warm air furnace.

_____
(Signature) (Date)

Section 705, cont'd

.15 **STATE** the types, operation, and features of hot water generating equipment.

_____
(Signature) (Date)

.16 **EXPLAIN** the operation of a hydronic distribution system, the types, and the components associated with such a system.

_____
(Signature) (Date)

.17 **IDENTIFY** the safety precautions associated with hot water systems.

_____
(Signature) (Date)

.18 **PERFORM** a pre-operational inspection and an operational test on a hot water system. Proper safety procedures must be followed.

_____
(Signature) (Date)

.19 **DEMONSTRATE** how to perform recurring maintenance on hot water systems and how to prepare the boiler for inspection.

_____
(Signature) (Date)

Section 705, cont'd

.20 **EXPLAIN** the troubleshooting process involved when working on hot water generating equipment and associated secondary equipment

_____
(Signature) (Date)

.21 **EXPLAIN** what an indirect system is.

_____
(Signature) (Date)

.22 **EXPLAIN** the properties of steam and the temperature of steam and water. **EXPLAIN** proper safety procedures and work precautions necessary working with steam.

_____
(Signature) (Date)

.23 **NAME** the types of steam boilers and how they are constructed.

_____
(Signature) (Date)

.24 **DESCRIBE / EXPLAIN** the following concerning steam boiler auxiliary equipment.

1. Draft systems
2. Feed water systems
3. Controls, and
4. Safety devices

_____
(Signature) (Date)

Section 705, cont'd

.25 **DESCRIBE** the steam-water cycle.

_____
(Signature) (Date)

.26 **EXPLAIN** the design of steam distribution systems and condensate return systems.

_____
(Signature) (Date)

.27 **PERFORM** a pre-operational inspection and an operational test on a steam system.

_____
(Signature) (Date)

.28 **DESCRIBE** the operation of the following components:

1. Steam clippers
2. Steam tables
3. Steam kettles
4. Steam pressure cookers

_____
(Signature) (Date)

Section 705, cont'd

.29 **DESCRIBE** the operation of the following components:

1. Gas-fired stoves
2. Gas-fired ovens
3. Gas-fired deep fat fryers

_____
(Signature) (Date)

.30 **EXPLAIN** the methods used to troubleshoot steam generator/components and steam distribution systems.

_____
(Signature) (Date)

.31 **EXPLAIN** why hydrostatic testing is useful in troubleshooting a distribution system and how this test performed.

_____
(Signature) (Date)

.32 **EXPLAIN** how to prepare a steam boiler for inspection.

_____
(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 706

706 Air Conditioning / Refrigeration Systems

References:
a. SW J3ABR3E131 003/004 IV, AC/R Systems[9]
b. PC J3ABR3E131 003/004 IV, AC/R Systems[10]
c. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
d. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition
e. Utilitiesman (Advanced), NAVEDTRA Course No: 14259, 1995 Edition

.1 **STATE** the differences between high and low pressure refrigerants, and the uses of each.

_____
(Signature) (Date)

.2 **DESCRIBE/EXPLAIN** the following:

1. Characteristics of a refrigerant
2. Cylinders
3. Contaminants
4. Refrigerant/oil relationships
5. Safety
6. Pressure/temperature

_____
(Signature) (Date)

[9] USAF Student Instructional Materials
[10] USAF Student Instructional Materials

Section 706, cont'd

.3 **DRAW** the refrigeration cycle and label the sides and components of the cycle. **EXPLAIN** the operation of the components and the physics of the refrigerant as it goes through the cycle.

_____

(Signature) (Date)

.4 **EXPLAIN** how a compressor is constructed and its operation.

_____

(Signature) (Date)

.5 **EXPLAIN** the following items concerning refrigerant oil:

1. Purpose of oils
2. Oil properties
3. Methods of lubrication
4. Proper oil level
5. Oil groups

_____

(Signature) (Date)

.6 **DESCRIBE** construction features of different condensers, their operation, and how their capacity is controlled.

_____

(Signature) (Date)

.7 **DESCRIBE** construction features of different evaporators, their operation, and how their capacity is controlled.

_____

(Signature) (Date)

Section 706, cont'd

.8 **EXPLAIN** how the following metering devices operate and their construction.

1. Metering orifice / capillary tube
2. Automatic expansion valve
3. Thermostatic expansion valve
4. Thermal expansion valve (external equalized)

_____

(Signature) (Date)

.9 **DESCRIBE** the operation of the following accessories**:**

1. Manual shut-off valves
2. Solenoid valves
3. Manifold gauge assembly

_____

(Signature) (Date)

.10 **PLOT** the pressures and temperatures of an operating refrigeration system. Use a pressure enthalpy chart.
EXPLAIN your plotting procedures.

_____

(Signature) (Date)

.11 **DESCRIBE** how ice machines are constructed and their operating principles.

_____

(Signature) (Date)

Section 706, cont'd

.12 **DESCRIBE** the operation of domestic refrigeration and water coolers.

_____

(Signature) (Date)

.13 **EXPLAIN** how flow controls work and where they're used.

_____

(Signature) (Date)

.14 **DESCRIBE** how ultra-low systems differ from the other systems. **ADDRESS** these areas:

1. Insulation requirements
2. Refrigerant and compressor problems
3. Staging
4. Compound systems
5. Controls
6. Lubricating oil for low temperatures

_____

(Signature) (Date)

.15 **EXPLAIN** the EPA's laws and regulations concerning penalties, Type II appliances, recovery machines, recovery techniques, the 3 R's, shipping, and disposal.

_____

(Signature) (Date)

Section 706, cont'd

.16 **DEMONSTRATE** how to remove refrigerant from a system.

_____

(Signature) (Date)

.17 **EXPLAIN** multiple evaporator systems and multiple compressor systems and where this application is used.

_____

(Signature) (Date)

.18 **PERFORM** and operational test on a commercial refrigeration system to see if it is within specifications. What safety considerations must be observed?

_____

(Signature) (Date)

.19 **EXPLAIN** summer design temperatures and calculate normal operating head pressure using condensing factors. **PERFORM** an operational test on a commercial refrigeration system to see if it is within manufactures specifications.

_____

(Signature) (Date)

.20 **DIAGNOSE** a commercial refrigeration system using the MGA.

_____

(Signature) (Date)

Section 706, cont'd

.21 **DESCRIBE** what "pumping down" a system means and the steps to perform it.

_____

(Signature) (Date)

.22 **EXPLAIN** how to find leaks in a system, **DESCRIBE** the different types of leak detectors that may be used and how they function.

_____

(Signature) (Date)

.23 **EXPLAIN** vacuum measurements, what is considered a deep vacuum.

_____

(Signature) (Date)

.24 **DESCRIBE** methods of evacuation.

_____

(Signature) (Date)

.25 **LIST** the types of vacuum pumps, how they operate, and how they are connected to the system to start evacuation.

_____

(Signature) (Date)

.26 **EXPLAIN** the methods of charging a system with refrigerant and procedures to reduce accidental Freon emissions.

_____

(Signature) (Date)

Section 706, cont'd

.27 **EXPLAIN** the methods of troubleshooting electrical components in a refrigeration system. Using a multimeter, **SHOW** how to check for shorts, opens, and low power in the control circuits.

_____

(Signature) (Date)

.28 **DESCRIBE** operation and construction of a cold storage system.

_____

(Signature) (Date)

.29 **IDENTIFY** EPA Type I appliances.

_____

(Signature) (Date)

.30 **DEFINE** the terms recovery, recycling, and reclaiming as it relates to refrigerant handling.

_____

(Signature) (Date)

.31 **EXPLAIN** and **DEMONSTRATE** the step-by-step procedure for refrigerant recovery from a system.

_____

(Signature) (Date)

.32 **EXPLAIN** and **DEMONSTRATE** the step-by-step process of recovery / recycling of contaminated refrigerant.

_____

(Signature) (Date)

Section 706, cont'd

.33 **DESCRIBE** the process of handling and disposing of contaminated refrigerant.

_____

(Signature) (Date)

.34 **IDENTIFY** the reason for performing an acid test on a refrigerant where compressor burnout occurred. What steps are taken if the test reveals contamination?

_____

(Signature) (Date)

.35 **WHAT** responsibility does the Department of Transportation (DOT) have concerning refrigerants and containers.

_____

(Signature) (Date)

.36 **DESCRIBE** the requirements of filling re-filling, and re-testing cylinders.

_____

(Signature) (Date)

.37 **PASS** exam for Universal certification which covers Types I, II, and III. (Certification is criterion test for section 706) .

_____

(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 707

707 Introduction to Utilities System

References:

a. SW J3ABR3E431 003/004/005-1-2 THRU 7, Occupational Safety and Health Act (OSHA) Program, Environmental Concerns, Mathematical Principles, Project Planning, Maintenance of Tools and Equipment[11]
b. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
c. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

707.1 **EXPLAIN** how OSHA standards apply to following items associated with the Utilitiesman Career Field;

1. Job Hazards
2. Safety Standards
3. Flammables
4. Cleaning Solvents
5. Fire Extinguishers

_____
(Signature) (Date)

.2 **EXPLAIN** why manual-lifting awareness is an important part of training for Utilitiesman.

_____
(Signature) (Date)

[11] USAF Student Instructional Materials

Section 707, cont'd

.3 **EXPLAIN** the environmental concerns that are a major part of this field. (include hazardous waste, potential sources of waste, handling and disposal, and record keeping)

_____

(Signature) (Date)

.4 **NAME** the common hand tools in the Utilities field and their uses.

_____

(Signature) (Date)

.5 **PERFORM** maintenance on hand tools and equipment associated with this career field.

_____

(Signature) (Date)

.6 **EXPLAIN** how to fill out condition tags and what their purpose is.

_____

(Signature) (Date)

.7 **DEMONSTRATE** how to dress and sharpen hand tools.

_____

(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 708

708 Interior/Exterior Waste Systems

References:
a. SW J3ABR3E431 003/004/005-II-1 thru 5, Sewer Lines, Structural Openings, Interior Waste System and Cast Iron Pipe, Valves[12]
b. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
c. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

708.1 **EXPLAIN** digging procedures, shoring, and the safety practices that must be considered, when excavating.

_____
(Signature) (Date)

.2 **EXPLAIN** methods of grading trenches, trench grading procedures, methods of grading pipe, and pipe grading procedures.

_____
(Signature) (Date)

.3 **GRADE** a 25' trench and sewer pipe with at least (4) joints.

_____
(Signature) (Date)

[12] USAF Student Instructional Materials

Section 708, cont'd

.4 **EXPLAIN** the purpose of backfilling and the steps to do it.

_____
(Signature) (Date)

.5 **DESCRIBE** structural design, locating structural openings, and the methods for cutting openings for fixtures.

_____
(Signature) (Date)

.6 **DEMONSTRATE** how to cut openings to within 1/8 inch of the given measurements.

_____
(Signature) (Date)

.7 **DISCUSS** the reason for reinforcing openings, use of vertical/horizontal support, and type of materials used.

_____
(Signature) (Date)

.8 **STATE** the safety considerations personnel should use around electrical power tools.

_____
(Signature) (Date)

.9 **EXPLAIN** the components of the interior sanitary waste system.

_____
(Signature) (Date)

Section 708, cont'd

.10 **DESCRIBE** the different types of stacks and vents.

_____
(Signature) (Date)

.11 **EXPLAIN** the importance of knowing the difference between traps and vents. Why they are used the way they are.

_____
(Signature) (Date)

.12 **EXPLAIN** cast iron pipe assembly and the methods of assembly.

_____
(Signature) (Date)

.13 **DEMONSTRATE** how to assemble 2 ten-foot lengths of cast iron pipe together. **SHOW** how to use a snap cutter.

_____
(Signature) (Date)

.14 **EXPLAIN** the cause of leaks in a waste system.

_____
(Signature) (Date)

Section 708, cont'd

.15 **DESCRIBE** the operation and inspection of each type of valve listed below.

1. Check valve
2. Globe valve
3. Gate valve
4. Ball valve
5. Plug valve
6. Altitude valve
7. Pressure reducing valve
8. Pressure relief valve
9. Quick opening valve

_____
(Signature) (Date)

.16 **DEMONSTRATE** maintenance, lubrication, and repair of a valve when given a repair kit with directions.

_____
(Signature) (Date)

.17 **DEMONSTRATE** how to remove and replace packing.

_____
(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 709

709 Interior/Exterior Water Systems

References:
a. SW J3ABR3E431 003/004/005-III-1 thru 6, Fundamentals of Water Distribution, Steel Pipe Assembly, Plastic Pipe, Water Heater Installation, Copper Tubing[13]
b. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
c. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

709.1 **DRAW** an interior and an exterior water distribution system; label the components.

_____
(Signature) (Date)

.2 **DESCRIBE** the process of tapping a water main and the equipment required.

_____
(Signature) (Date)

.3 **STATE** the procedure for roughing-in water lines.

_____
(Signature) (Date)

[13] USAF Student Instructional Materials

Section 709, cont'd

.4 **CUT** and **THREAD** (2) pieces of 3/4" galvanized pipe to a length of 18 inches. Use a hand threader for the first one and a power threader for the second one. Lengths must be 18 ± 1/8".

_____

(Signature) (Date)

.5 **DESCRIBE** the types of power threaders available, safety considerations, and routine maintenance.

_____

(Signature) (Date)

.6 **STATE** the purpose and types of a pressure tests.

_____

(Signature) (Date)

.7 **EXPLAIN** the cause of pressure loss and why it is important to maintain proper pressure in a system.

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(Signature) (Date)

.8 **INSTALL** a water distribution system using galvanized pipe and pressure check it. No leaks are allowed.

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(Signature) (Date)

.9 **DESCRIBE** the applications where plastic pipe is used and the advantages/disadvantages.

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(Signature) (Date)

Section 709, cont'd

.10 **ASSEMBLE** plastic pipe by solvent welding, threading, and insert fittings. Leaks are not allowed.

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(Signature) (Date)

.11 **DESCRIBE** the installation procedures for a plastic pipe distribution system.

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(Signature) (Date)

.12 **INSTALL** a plastic pipe water distribution system through to the fixtures.

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(Signature) (Date)

.13 **EXPLAIN** the construction features of water heaters, the installation requirements, and how they are serviced. How do gas and electric heaters differ?

_____
(Signature) (Date)

.14 **INSTALL** a water distribution system using copper pipe. There must be no leaks.

_____
(Signature) (Date)

UTILITIESMAN
Qualification Standards
Section 710

710 Fixture Installation

References:
a. SW J3ABR3E431 003/004/005-IV-1 thru 9, Lavatory Installation, Water Closet Installation, Urinal Installation, Shower Installation, Winterization of Piping, Inspection and Maintenance of Interior Water Distribution Systems and Fixtures, Material Recovery and Restoration[14]
b. Utilitiesman (Basic) Vol. I, NAVEDTRA Course No: 14265, 1998 Edition
c. Utilitiesman (Basic) Vol. II, NAVEDTRA Course No: 14279, 1999 Edition

710.1 **INSTALL** a domestic lavatory. There must be no leaks.

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(Signature) (Date)

.2 **INSTALL** a tank type water closet and components. There must be no leaks.

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(Signature) (Date)

.3 **EXPLAIN** flushing actions and flush tanks.

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(Signature) (Date)

[14] USAF Student Instructional Materials

Section 710, cont'd

.4 **INSTALL** a wall hung urinal and flushometer.

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(Signature) (Date)

.5 **INSTALL** a shower and mixing valve assembly.

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(Signature) (Date)

.6 **EXPLAIN** the purpose of winterization of a water system and a waste system.

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(Signature) (Date)

.7 **EXPLAIN** the procedures for thawing frozen pipes.

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(Signature) (Date)

.8 **DESCRIBE** how to locate frozen areas and methods of thawing pipes.

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(Signature) (Date)

.9 **EXPLAIN** the purpose as well as the types and forms of insulation.

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(Signature) (Date)

Section 710, cont'd

.10 **REMOVE** and **REPLACE** damaged copper pipe and fittings. Repairs must not leak.

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(Signature) (Date)

.11 **REMOVE** and **REPLACE** damaged galvanized pipe and fittings. Repairs must not leak.

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(Signature) (Date)

.12 **REPAIR** traps and faucets.

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(Signature) (Date)

.13 **REPAIR** water closet tank components.

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(Signature) (Date)

.14 **REPAIR** a flushometer.

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(Signature) (Date)

.15 **REPAIR** an interior drainage system.

_____
(Signature) (Date)

Section 710, cont'd

.16 **DESCRIBE** common fixture stoppages and the different types of plungers/tools used to free them.

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(Signature) (Date)

.17 **IDENTIFY** the procedures for using chemicals to open clogged drains.

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(Signature) (Date)

.18 Given procedures and a hand auger, **REMOVE** a stoppage from piping. The piping must drain properly when procedures are completed.

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(Signature) (Date)

.19 Given a list of procedures for using chemicals to open clogged drains, **ARRANGE** the procedures in proper sequence with at least 70% accuracy.

_____
(Signature) (Date)

.20 Given procedures and a power auger, **REMOVE** a stoppage from a fixture. The fixture must drain properly when procedures are completed.

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(Signature) (Date)

Section 710, cont'd

.21 Given a list of fixture stoppages and a list of plungers, **DETERMINE** which plunger would be used on each stoppage with at least 70% accuracy**.**

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(Signature) (Date)